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(54) COUPLING MEMBER

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No. OF CLAIMS 35

ABSTRACT OF THE DISCLOSURE:

A coupling member comprising: a valve body, a sleeve which is displaceable in a longitudinal direction in relation to said valve body, a sealing element provided on said valve body, said sleeve having a sealing position in which it seals the valve body by means of said sealing element, the valve body is provided with a supporting device having a substantially radial surface, and the sleeve is provided with a corresponding radial surface and in the sealing position the sleeve rests on the radial surface of the supporting device by means of the corresponding radial surface of its own. A cylindrical inner wall of the sleeve extends past the sealing element, the cylindrical wall forming together with the valve body and the supporting device a substantially closed chamber for the sealing element. A gap faces away from the supporting device and communicates with a medium pressure inside the coupling member, the medium pressure actuating the sealing element and contributing to an effective mutual sealing of the valve body and the sleeve by means of the sealing element.

The present invention relates to a coupling member.

The present invention is aimed at utilisation, inter alia, on «environmental couplings» or non-spill couplings where the a coupling member is, by means of a rapid coupling function, capable of interacting with another coupling member. The connected medium can comprise hydraulic oil.

The method is already known of designing the said environmental couplings as «flat nose couplings», which are characterized in that both coupling members are provided with nose sections with essentially plane frontal surfaces which can easily be wiped dry prior to the coupling members being connected together. In such a non-spill flat nose coupling the said sleeve is incorporated in the form of an inner sleeve which is spring-actuated in one direction, and in its other direction it can be displaced by means of the second coupling component against the said spring action. Here it is important that the sleeve in the position in which it is not affected by the second coupling member can adopt a sealing position by means of the said spring action and possibly pressure from a medium which is present in the coupling member which is thus closed. In this connection the sealing arrangement should be such that the force when the coupling members are joined together does not become excessive. In the known type of flat nose couplings a covering sleeve arrangement is also employed which is displaceable relative to the said sleeve and valve body. The said sealing covering sleeve arrangement exhibits an external surface which forms part of the essentially plane frontal surface of the coupling member.

With the relevant types of couplings it is important to be able to bring about a sealing arrangement for the inner sleeve and the valve body which provides

the necessary high standard of sealing, whilst at the same time the components involved are constructed in such a way that manufacturing costs can be kept at a relatively low level.

It is also important that the different portions of the coupling be designed so that dirt and extraneous particles are prevented from entering at the frontal surfaces of the coupling members concerned.

According to the present invention, there is provided a coupling member comprising: a valve body, a sleeve which is displaceable in a longitudinal direction in relation to said valve body, a sealing element provided on said valve body, said sleeve having a sealing position in which it seals said valve body by means of said sealing element, said valve body being provided with a supporting device having a substantially radial surface, and said sleeve being provided with a corresponding radial surface and in said sealing position said sleeve resting on said radial surface of said supporting device by means of said corresponding radial surface of its own. A cylindrical inner wall of said sleeve extends past said sealing element, said cylindrical wall forming together with the valve body and the supporting device a substantially closed chamber for the sealing element. A gap faces away from the supporting device and communicates with a medium pressure inside the coupling member, the medium pressure actuating the sealing element and contributing to an effective mutual sealing of the valve body and the sleeve by means of the sealing element.

In further embodiments of the present invention a flap may be provided, capable of being folded down, and forming part of the valve body, which in the rolled down position fixes the sealing element to the valve body. The said flap may be furthermore so arranged that the sealing

element is given a protected position with respect to the medium pressure.

Furthermore, more comprehensive details are given of the construction of the supporting device and the inner sleeve so as to preferably form a suitable chamber which fundamentally exceeds the volume of the sealing element and is arranged in such a way that effective deformation of the sealing element is brought about, which is to some extent pressed directly axially against the radial top surface of the supporting device, and to some extent directly radially against the inner wall of the sleeve, whereby reliable sealing of the essentially radial gap between the valve body and sleeve is achieved.

In connection with the said further embodiments, improvements are also proposed in connection with the design of the inner sleeve and of the valve body which become feasible thanks to the invention. In addition details are given as to how the supporting device is to be arranged in relation to the opposing sections on a further sleeve, in the form of a covering sleeve, which is located outside and capable of movement in relation both to the inner sleeve and the valve body. The latter-mentioned components can in this connection form part of a flat-nosed environmental coupling arranged with rapid coupling function for the two coupling members.

The proposals above provide an effective sealing arrangement with technical/economical advantages for, inter alia, the above mentioned types of couplings, the other components of which can - thanks to the present invention - also be given an appropriate and economic design.

Thanks to the new arrangement there is only one gap in the essentially plane frontal surface on the coupling component concerned, which in an excellent manner also reduces the risk of dirt penetration in the media

system. Furthermore the sealing element is given a location which is protected from the said dirt and extraneous particles.

The sealing arrangement may function both at low and high pressure, the latter for example being capable of exceeding 30 Mpa. In the latter case the sealing arrangement and sleeve may be so arranged that the pressure of the actual medium affects the sealing element and, by exerting purely axial and radial forces on this, contributes to effective sealing.

Thanks to the proposals above, I avoid the sleeve resting on the supporting device via slanting sealing surfaces which require relatively high manufacturing precision and considerable thickness of the material in the sleeve.

A preferred embodiment will now be described hereinafter as example only, with no limitative manner, having reference the attached drawings in which:

Fig. 1 shows in longitudinal section two quick coupling members designed for hydraulic oil in the de-coupled position, the said quick coupling members forming together a non-spill environmental coupling with essentially plane frontal surfaces on the coupling members,

Fig. 2 shows in longitudinal section the coupling members as in fig. 1 in a fully coupled position, whereby coupling together takes place with the aid of automatic coupling components on the coupling members,

Fig. 3 shows enlarged and in longitudinal section portions of the frontal section of the first coupling component (female portion) of the coupling members in fig. 1 and 2,

Fig. 4 shows in longitudinal section a modified embodiment of the components shown in fig. 3,

Fig. 5 shows in longitudinal section one half of the female coupling member in a further modified embodiment, and

Fig. 6 shows in longitudinal section one half of the female coupling member in an embodiment modified over all the other embodiments.

The coupling as shown in fig. 1 and 2 comprises first coupling member 1 and a second coupling member 2, whereby coupling member 1 comprises a female portion and coupling 2 is a male portion.

The coupling forms a «flat nose coupling» where the respective coupling members are made with an essentially plane frontal surface 1a and 2a respectively.

Couplings of this type are as such assumed to be well known, so that only a brief account will be given here of their fundamental construction and function. The first coupling member 1 includes a valve body, of the «shank design», which is located firmly and coaxially relevant to the first coupling member inside the first coupling member. An inner sleeve 4 and an outer sleeve or covering sleeve 5 are arranged so that they can be displaced relative to the valve body 3. The outer sleeve 5 is angled at one end and at its other end is subject to spring action by a spiral spring 6 which tries to keep the outer sleeve pressed against the said frontal surface 1a.

The valve body includes inter alia a valve head 3a which carries a seal 7 and on its first end sections 4a the inner sleeve is designed, when in a sealing position as shown in fig. 1, to interact with the said valve head 3a and the sealing ring 7, so that a sealing function is obtained between the sleeve 4 and the valve head 3 with the aid of the seal. A spring 8, preferably a helical spring, is effective against the other end portions of the sleeve 4, more precisely the end edge 4b, and tries to maintain the inner sleeve in

the sealing position. At its upper end sections the inner sleeve carries a further seal 9 which comprises a «back-up» seal of a type which as such is well known. The sleeve 4 is mounted in a first recess 1b in the first coupling member, whereby the sleeve receives guidance on a first internal wall 1b' of the said recess. The seal between the sleeve 4 and the said inner wall 1b' is provided by means of the said seal 9. The said first chamber or recess 1b comprises a partial chamber in the first coupling member and is provided with a portion 1c which extends axially inside the first coupling member.

The outer sleeve rests in the second chamber 1d in the first coupling member, whereby the wall of the chamber is designated 1d'. The outer surface rests against this inner wall 1d' and the outer extreme position of the outer sleeve is governed by a lip 5a thereon. The angled portion 5b of the outer sleeve is designed to be capable of interacting with frontal portions of the second coupling member, with the aid of which the outer sleeve is thus capable of insertion in the first coupling member. With a given degree of insertion the outer sleeve interacts with the inner sleeve 4 and entrains this. This entrainment occurs as a result of the interaction between the free end of the angled portion 5a and a shoulder 4c, which is provided by means of a recess 4d on the inner sleeve.

The valve body is also provided with a shank portion 3b which extends coaxially in relation to the inner sleeve and up to or beyond the upper end surface 4b of the latter. The end of the shank which faces towards the valve head 3a is linked with a flow distribution housing 3c which is similarly part of the valve body and which is provided with an external thread, which can be screwed into a corresponding internal thread 1e in the coupling member 1.

In the flow distribution housing the flow which

arrives from the incoming chamber 1f of the coupling member is distributed to a number of outlets 3c', 3c'', which can for example be four in number and uniformly distributed around the central axis 10 of the coupling member. The exit holes are furthermore sloping and the shank is terminated in the housing by a tip 3b' which projects into the housing and by sloping surfaces 3b'' and 3b'''. From the said outlets the flow is led down into chamber 1b and into the sleeve 4. With the sleeve in its sealing position the pressure in the first coupling member is inter alia effective on the upper end surface 4b of the inner sleeve. The medium is sealed off as outlined above by means of the seals 7 and 9.

The first coupling member also incorporates outer locking sleeves 11 and 12, which as such are well known, and which with the aid of locking balls 13 and 14 and a further spring 15 are arranged to bring about in a known manner an automatic quick coupling function when coupling members 1 and 2 are joined together. The second coupling component is for this purpose provided with a radial outer groove 2b, via which interaction occurs with the locking balls 13 in the first coupling member.

The second coupling member 2 exhibits an axially displaceable valve body 16 which by means of a spring 17 is pressed against the front portions of the coupling member. The valve body 16 is coaxially mounted in a cross mounting 18 which rests against the inner wall 2c of coupling member 2. The valve body 16 is expanded at its free end and is sealed by means of a seal 19 of the «back-up» type.

Fig. 2 shows inter alia how the flow path is formed through the connected members 1 and 2, whereby the flow medium is indicated by 20. Even if the flow as such can be imagined as being led in the opposite direction, the flow path 20 in the present case leads from chamber 1f,

through the flow distribution housing 3c to the chamber between the inner sleeve 4 and the shank 3b, then on the outside of valve heads 3a and 16, and down and through the wings 18 of the cross mounting. With the position for the medium thus open, sealing of the flow takes place by means of the seal 9 and seal 19 which seal against the outside of the inner sleeve 4 at the recess 4d.

Fig. 3 shows in greater detail, inter alia, a flap 21 arranged in the material of the valve head 3a, which adopts a rolled-down position over the sealing element 7 so that the sealing element is reliably fastened to the valve head. The valve head 3a also carries a supporting device 22 extending radially which supports a supporting flange, which is essentially radial, or supporting surface 22a, against which the sleeve end 4a is arranged to rest with its end edge surface 4a' which extends straight and parallel with the surface 22a. The outer tip of the rolled-down flat 21 and the outer tip of the supporting device 22 are denoted by 21' and 22' respectively.

If we again examine Fig. 2 the said outer tips 21' and 22' are also indicated here. This shows that an imaginary straight line drawn between the said tips extends right outside the sealing element, or essentially in connection with the tangents of the sealing element which are parallel with the straight line. This means that the sealing element is provided with an excellently protected position for the flow of the medium which is deflected towards the top surface 3a' of the valve head 3a. If for example the medium comprises hydraulic oil, then no extraneous particles present in the hydraulic oil can have a harmful effect on the sealing element.

Fig. 2 also shows that the lower portions 4a of the inner sleeve exhibit an internal chamber for 4a'' which facilitates the guidance of the sleeve to the sealing position

via the tip of the flap 21' which thereby also functions as the guidance device for the inner sleeve.

The inner sleeve is simple in construction with a straight inner wall 4e and a straight outer wall which is reduced in section one step with the straight recess 4d (fig. 1).

The supporting device 22 shown in fig. 3 is relatively strong and is between 0,5 - 5 mm in thickness, which dependent on coupling type and/or coupling size. The straight radial upper surface 22a is height levelled at the location of the sealing ring 7, whereby a surface which is displaced in parallel in relation to the surface 22a is denoted by 22b. The latter partial surface is directly adjacent to the inner wall 4e of the inner sleeve, when the inner sleeve rests on the supporting device. The said surface 22b changes into a curved circular partial surface 22c which is terminated at the top by the said rolled-down flap 21. The supporting device is essentially the same thickness as, preferably somewhat thicker, than the free end 5a' of the angled portion 5a of the outer sleeve 5.

An essentially closed chamber 23 is thus formed for the sealing element 7 with the partial surfaces 22b and 22c, the rolled down flap 21 and the inner wall 4e. The said closed chamber communicates with the inner chamber of the sleeve 4 via a gap 24, facing away from the supporting device 22, which gap is between 0,1 and 0,2 mm. In the closed position of the sleeve, the inner wall 4e is guided by the axial surface or step which connects surfaces 22a and 22b, and the gap between the sleeve and last mentioned surfaces is right-angled, i.e. the gap between the axial surface and 22a forms a «L».

The volume of the chamber 23 exceeds the volume of the sealing element 7 and the sealing element projects beyond the flap 21 in a radial direction by 2/5 - 1/10 of

its section which is circular in the present case. The degree of projection is about 1/5.

As a result of the step-shaped radial sealing surface 22a and 22b, where the end surface 4a' on the sleeve rests against the surface 22a and surface 22b originates from the inner surface 4e of the sleeve, an effective sealing function is obtained even with high pressure of the medium which affects the sealing element in the axial direction via the gap 24. The sealing element is pressed axially against the surface 22b by the pressure and the radial forces generated in the sealing element are effective against the inner surface 4e of the sleeve. This provides an effective sealing function and the sleeve 4 can be dimensioned so that its sleeve end is made of relatively thin material. At low medium pressures the spring 8 ensures that the sleeve is pressed against the supporting surface 22a so that a required seal is obtained via the inner wall 4e of the sleeve. The pressure of the medium is effective on the end surface 4b of the sleeve and at high pressure this together with the spring ensures adequate contact on the part of the sleeve.

The said free end 5a of the angled portion 5c of the outer sleeve 5 is opposite to the free end surface 22d of the supporting device, the opposite surfaces having essentially the same height and being arranged with an intervening gap of 0,1 - 0,5 mm. The essentially plane lower surface 5a'' of the angled portion, the free end of which connects with the plane lower surface of the valve head 3a, is also sloping, in as much as it slopes from the outer edge inwards/upwards. An angle of slope α is thus equal to 0 - 15°, preferably about 5° in the case illustrated.

The outer edge 5a''' of the radial portion of 5a connects with a chamfer lg' on the ball holder lg arranged on the first coupling member, which chamfer is about 45° in relation to the axis 10 and extends along ca half up to 2/3

of the material in the ball holder 1g. The front surface of the first coupling component is formed in this way by straight and mutually interrupted partial surfaces 26 (on the valve head 3a), 5a'' (on component 5a), and 1g' and 1g'' (on component 1g). The said chamfered surface 5a'' with the coupling components connected together, gives rise to a ring-shaped and wedge-shaped chamber 27, into which small quantities of dirt, oil etc. which have not been wiped off can penetrate downwards so that they do not interfere with the engagement of the couplings.

Fig. 4 illustrates the case where the lower surface 5a'' is also straight. In this case the thickness of the supporting device is illustrated by a and the step between the surfaces 22a and 22b is denoted by b. The latter-mentioned distance is 0,1 - 2,0 mm.

The function of the coupling is known from prior art. The male portion 2 is introduced into the female portion, whereby the outer sleeve 5 is pushed in and the seal 19 seals against the inner sleeve when the valve 16 in the male portion 2 is opened by the coupling force. When the outer sleeve 5 is inserted to a certain extent this interacts with the inner sleeve and entrains the latter, whereby the sealing arrangement together with the seal 7 is opened. When the components are locked to each other the flow path 20 is thus completely open.

When the members are disengaged the springs 6 and 8 retract the sleeves 5 and 4 respectively. The seal 19 no longer interacts with the sleeve 4 after this has sealed against the valve head 3a, whereupon finally the outer sleeve 5, also the valve 16 in coupling member 2, revert to their outer position as shown in fig. 1.

Figs. 5 and 6 show further embodiments of the coupling member of the present invention. At large medium pressure it can be advantageous to discharge the fixed valve

body from forces of the sleeve 4', 4'' so the latter one does not rest only on the valve head 3a', 3a'' in the closed or sealed position. According to said embodiments the first coupling member is provided with a tube portion or tube formed part fastened to the body of the first coupling member and separating the space of the spring for the outer sleeve 5', 5'' from the space of the inner sleeve 4', 4''. Said tube formed part is attached to the coupling body via threads 29 and 32, respectively. The embodiment of Fig. 5 having a seal 30 as well for preventing leakage.

Said tube formed part carries the flow distribution housint 28, which according to Fig. 5 can be attached by means of press fit or, according to Fig. 6, by means of threads 34. The valve body can in a corresponding way be attached to the flow distribution housing by press fit as in Fig. 5 or by threads 33 as in Fig. 6.

In the lower parts, the tube formed part is provided with an inwardly directed flange which serves as discharging device for the sleeve 4', 4'', which having a corresponding flange or shoulder positioned below the sealing device of the sleeve, which sealing device is of «back-up» type. The end positions of the sleeve are shown by full and dotted lines, respectively. Furthermore, the sleeve having on its upper end a shoulder allotted to its belonging spring.

Said discharging devices are adapted so that the sealing function between the sleeve 4', 4'' and the valve head 3a', 3a'' always is carried through safely before discharging occurs. The outer sleeve 5', 5'' is in these embodiments provided with not shown axial slots at its upper parts. Said slots make it possible to push in said outer sleeve via the front surface of the coupling member in the manufacturing procedure of the coupling. At the applying, the slotted parts of the sleeve can spring inwards and after that spring back again when the sleeve obtains its working position according

to Figs. 5 and 6. The embodiments of Figs. 5 and 5 allow also a comparatively simple and cheap production of the concerned coupling member. The assembling of a unit of concerned preassembled components can be carried out mainly from the rear of the coupling member. Material savings are attained as well, which contributes to a simple and cheap coupling member.

The invention is not restricted to the embodiments described above by way of example, but can also be subjected to modifications within the framework of the subsequent patent claims. Thus for example the whole or parts of valves 3a, 3b, 3c can be arranged so as to be capable of some movement in the axial direction relative to the first coupling member. Similarly the exits from the flow distribution housing 3c can be located further out in relation to the orifice on the first coupling member i.e. the outer wall 3c''' can be lengthened and the shank 3b can be shortened to the desired extent.

The object of the present invention facilitates couplings which are suitable for rational production methods in large and small workshops. The right-angled gap between the inner sleeve 4 and the supporting member 22 of the valve head is easy to manufacture with great accuracy which guarantees a good sealing function as described above. The axial surface which connects surfaces 22a and 22b guarantees that the inner sleeve always gets coaxially the right position in relation to the sealing surfaces on member 22 and seal 7.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A coupling member comprising:

- a valve body,

- a sleeve which is displaceable in a longitudinal direction in relation to said valve body,

- a sealing element provided on said valve body, said sleeve having a sealing position in which it seals said valve body by means of said sealing element,

- said valve body being provided with a supporting device having a substantially radial surface,

- said sleeve being provided with a corresponding radial surface and in said sealing position said sleeve resting on said radial surface of said supporting device by means of said corresponding radial surface of its own,

- a cylindrical inner wall of said sleeve extending past said sealing element, said cylindrical wall forming together with said valve body and said supporting device a substantially closed chamber for said sealing element,

- a gap facing away from said supporting device and communicating with a medium pressure inside said coupling member, said medium pressure actuating said sealing element and contributing to an effective mutual sealing of the valve body and the sleeve by means of the sealing element.

2. Coupling member according to claim 1, wherein said valve body is fixed with respect to said coupling member.

3. Coupling member according to claim 1, wherein said valve body is displaceable with respect to said coupling member.

4. Coupling member according to claim 1, said coupling member being a female coupling member cooperating with a male coupling member for forming a coupling.

5. Coupling member according to claim 3, wherein the sealing element is attached to the valve body by means of a flap capable of being rolled down, characterized in that the roll-down flap is located on the opposite side of the sealing element in relation to the supporting device.

6. Coupling member according to claim 5, wherein the rolled-down flap is arranged to control said gap and in the rolled-down state it extends over the sealing element, said sealing element having O-ring shape so that in the radial direction it projects beyond the flap by 2/5 - 1/10 of its cross sectional area.

7. Coupling member according to claim 6, wherein said inner wall of said sleeve is straight and has a first end portion which interacts with said supporting device and sealing element, said sleeve being subjected to spring action at its other end portion by a compression spring.

8. Coupling member according to claim 3, wherein said valve body comprises a valve head supporting said sealing element and a shank which is attached by a first end to said valve head and which extends coaxially inside said sleeve, said sleeve extending upwards in connection with the other end of the shank which is fastened to a flow distribution housing which forms part of the valve body, said housing having orifices which lead out into a recess in said first coupling member where said sleeve is mounted, said orifices being located at a second end portion of the sleeve.

9. Coupling member according to claim 3, comprising a second sleeve arranged radially outside the first-

mentioned sleeve, said second sleeve being displaceable relative to said valve body and said first sleeve, characterized in that the supporting device has an axial straight end edge which is opposite a corresponding straight end edge on the second sleeve with an intervening gap of 0,1 - 0,5 mm in width, and that the supporting device has a thickness, of 0,5 - 5 mm, which essentially corresponds to the thickness of that portion of the second sleeve which carries the said corresponding straight end edge, so that the lower end surface of said first sleeve is located essentially at the same level as an inner surface present on the said portion of the second sleeve.

10. Coupling member according to claim 9, wherein said first sleeve has a straight outer wall which is reduced at its first end portion, the axial end edge of the supporting device having roughly the same diameter as said reduced first end portion of said sleeve, said reduced first end portion controlling the maximum displacement of said second sleeve relative to the first sleeve.

11. Coupling member according to claim 10, wherein said valve body and said supporting device have outer surfaces which are straight in the radial direction and connect with a straight outer surface on said second sleeve.

12. Coupling member according to claim 10, wherein said valve body and said supporting device have outer surfaces which are straight in the radial direction and connect with a sloping outer surface on said second sleeve.

13. Coupling member according to claim 9 or 11, wherein said coupling member is a female coupling member and it is capable of interaction in a quick coupling with another male coupling member, said outer surface on second sleeve sloping, a ring-shaped and wedge-shaped chamber being formed

between said female and male coupling members in their engaged position.

14. Coupling member according to claim 1, wherein said radial end surface of said first sleeve, which rests against the radial surface of said supporting device in the sealing position, is arranged at right angles in relation to the inner wall of said first sleeve, and rests against the radial surface of the supporting device along its entire length, the inner edge of the end surface being given a chamfer, said chamber for sealing exceeding the volume of the sealing element.

15. Coupling member according to claim 9, wherein said first sleeve is provided with a discharging device which interacts with a corresponding discharging device in the first coupling member after that said sealing is carried out between said first sleeve and the valve body.

16. Coupling member according to claim 5, wherein said sealing element projects beyond said flap by about 1/5 of its cross sectional area.

17. Coupling member according to claim 1, wherein said gap is formed between said sleeve and said supporting device and is right-angled.

18. Coupling member according to claim 17, wherein said radial surface is height levelled at a location of said sealing element whereby to form a further radial surface which is displaced in parallel with respect to said radial surface, an axial surface or step being thus formed between said radial surface and said further radial surface.

19. Coupling member according to claim 17, wherein said gap is formed between said axial surface and said radial surface and is L shaped.

20. Coupling member according to claim 19, wherein said supporting device is between 0,5 to 5 mm in thickness.

21. Coupling member according to claim 20, wherein said further radial surface changes into a curved circular partial surface which terminates with a flap capable of being rolled down, said flap being located on the opposite side of the sealing element in relation to the supporting device.

22. Coupling member according to claim 21, wherein said closed chamber is formed with said further radial surface, said curved partial surface, said rolled-down flap and said inner wall of said sleeve.

23. Coupling member according to claim 22, wherein said closed chamber communicates with an inner chamber of said sleeve by means of said gap, facing away from said supporting device, said gap being between 0,1 and 0,2 mm.

24. Coupling member according to claim 9, wherein said second sleeve has a free end with an angled portion, said free end being opposite a free end surface of said supporting device, said opposite surfaces having the same height and being arranged with an intervening gap of 0,1 - 0,5 mm.

25. Coupling member according to claim 24, wherein said angled portion has a substantially plane lower surface which slopes inwardly and upwardly by an angle of up to 15°.

26. Coupling member according to claim 25, wherein said angle is 5°.

27. Coupling member according to claim 25, wherein said angled portion has an outer edge opposite said free end thereof with a chamfer on a ball holder arranged on

said coupling member, said chamfer being about 45° in relation to the longitudinal axis of said coupling member.

28. Coupling member according to claim 9, wherein said second sleeve has a free end with an angled portion, said angled portion having a lower surface which is straight.

29. Coupling member according to claim 18, wherein said step between said radial surface and said further radial surface measure from 0,1 to 2.0 mm.

30. Coupling member according to claim 1, further comprising a second sleeve arranged radially outside the first mentioned sleeve, said second sleeve being displaceable relative to said valve body and said first inner sleeve, said coupling element further comprising a tube portion separating said outer sleeve from said inner sleeve.

31. Coupling member according to claim 30, wherein said tube portion is connected to said coupling member by means of threads.

32. Coupling member according to claim 31, wherein said tube portion carries a flow distribution housing.

33. Coupling member according to claim 32, wherein said flow distribution housing is press fit in said tube portion.

34. Coupling member according to claim 32, wherein said flow distribution housing is connected by means of threads to said tube portion.

35. Coupling member according to claim 32, wherein said tube portion is provided with an inwardly directed flange serving as discharging device for said inner sleeve.

Fig. 1

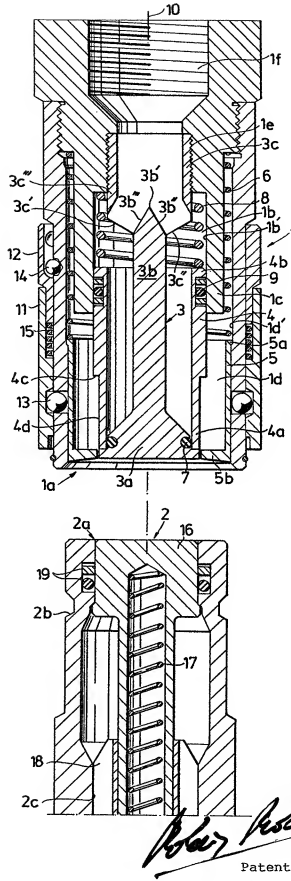

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Fig. 2

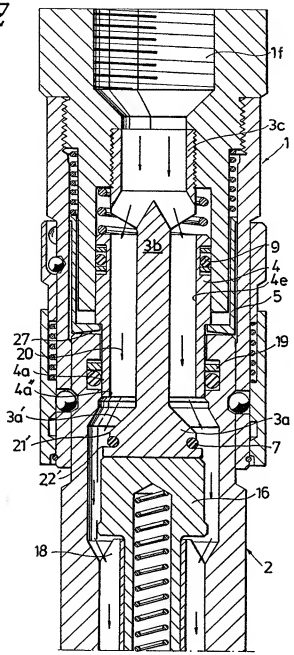

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Fig. 3

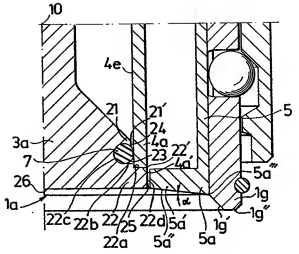

Fig. 4

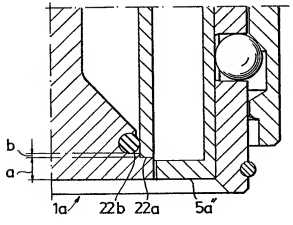

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Fig. 5

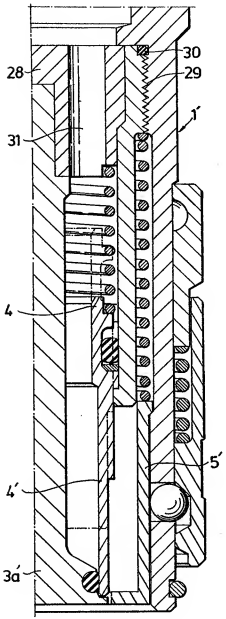
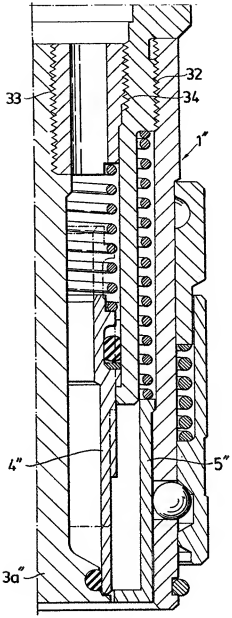


Fig. 6



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